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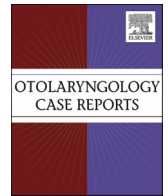
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Retropharyngeal medialized internal carotid artery encountered prior to pediatric tonsillectomy: A case report and review of the literature

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ABSTRACT

Tonsillectomy is one of the most common surgical procedures performed in the United States with approximately 339,000 ambulatory tonsillectomies performed in 2010. Of these, an estimated 299,000 tonsillectomies were performed on patients less than 15 years of age. Damage to the internal carotid artery during routine tonsillectomy is a rare but feared complication of this relatively routine surgical procedure. We present the case of a medialized internal carotid artery encountered prior to pediatric tonsillectomy, as well as a review of the literature on internal carotid artery development and anatomic variations.

1. Introduction

Tonsillectomy is one of the most common surgical procedures performed in the United States with approximately 339,000 ambulatory tonsillectomies performed in 2010 [1]. Of these, an estimated 299,000 tonsillectomies were performed on patients less than 15 years of age [1]. Tonsillectomy is commonly the first-line treatment for children with obstructive sleep apnea and is also performed for children with recurrent tonsillitis who meet Paradise criteria. Damage to the internal carotid artery (ICA) during routine tonsillectomy is a rare but feared complication of this relatively routine surgical procedure. In fact, damage to the ICA during tonsillectomy was first described in the 1780s [2]. Damage to the ICA can lead to hemorrhage and death. We present the case of a medialized ICA encountered prior to pediatric tonsillectomy.

2. Case report

We present a patient with an aberrant retropharyngeal ICA discovered during aborted tonsillectomy and adenoidectomy. The patient was a 4 year old boy with significant past medical history of birth at 25 weeks gestational age. He was intubated at birth and remained intubated for the first 2 months of life. The patient presented for surgical consultation for the treatment of obstructive sleep apnea. A preoperative polysomnogram demonstrated an Apnea/Hypopnea Index of 11.8 and oxygen nadir of 85.7%. The patient was taken to surgery for ambulatory tonsillectomy and adenoidectomy. Upon placement in suspension, a pulsatile mass was seen in the right posterior oropharynx (Fig. 1). A

medialized carotid artery was suspected, and the surgery was aborted. Prior to extubation, a computed tomography angiogram of the head and neck was obtained to evaluate the course of the suspected medialized carotid artery. The right ICA was noted to take a medial course into the retropharyngeal space, 2.6 mm deep to the oropharynx (Fig. 2). The child's parents were counseled that all future surgical and anesthesia staff should be made aware of his anatomic variant should he require surgery in the future, as his anatomic variant places him at greater-than-average risk for catastrophic bleeding.

Following the aborted surgery, the decision was made to manage the patient with observation. The patient and his parents were seen in clinic six months after the aborted tonsillectomy and reported improved snoring. The patient and his parents were offered a repeat sleep study; however, they declined. The patient was seen by his pediatrician for his well child visit one year later and was noted to have complete resolution of his snoring.

3. Discussion

The incidence of ICA aberrations is estimated in the literature between 10% and 40% [3]. The normal course of the cervical ICA runs straight to the skull base, posterolateral to the pharyngeal wall [3]. The average distance of the ICA to the pharyngeal wall is age-dependent; in adults, this distance is an average of 2.5 cm [3]. In children, this distance has been shown to grow exponentially with both age and weight until the average distance of 2.5 cm is achieved [4].

Dysphagia, dysphonia and globus/foreign body sensation are the

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Fig. 1. Medialized internal carotid artery seen in the right oropharynx.

typical presenting symptoms for older patients with newly discovered ICA anomalies [5]. These symptoms may present in old age as age-related loss of elasticity in the vessel wall makes these abnormalities more clinically significant, with an increased prevalence of looping and coiling of the ICA in older age groups [5]. However, abnormalities of the course of the ICA has been estimated to be silent in 80% of cases [2].

In typical embryonic development, the bilateral ICAs develop from the junction of the third aortic arch (third brachial arch artery) and the cranial segment of the dorsal aorta [5]. Looping, coiling, and tortuosity of the ICA is thought to be caused by failure of typical elongating and straightening of the ICA during descent of the major vessels and heart into the mediastinum at weeks 5 and 6 [3]. Coiling typically takes an anteromedial course, as the ICA crosses the glossopharyngeal nerve. However, the theory that anomalies of the ICA are purely congenital in

origin remains controversial [5].

In terms of long term prognosis, kinking of the ICA has been associated with arteriosclerosis, stenosis, vasculitis, atrophic dilatation, loss of elasticity, or dissection in the context of fibromuscular dysplasia. Kinking is more frequently associated with cerebrovascular disease than curving and coiling of the ICA, due to impediment of blood flow, which may in turn lead to more degenerative changes of the vessel. Coils are more frequently associated with inadvertent injury [5]. However, anatomic classification according to tortuosity, kinking and coiling does not correlate with the vessel's distance to the pharyngeal wall or the pharyngeal level at which the vessel is nearest the pharyngeal wall [3]. Pfeiffer et al. described a classification scheme based on two important factors: the minimum distance of the ICA to the pharyngeal wall and the pharyngeal level. In this schema, vessels closest to the oropharynx and nasopharynx are graded at increased risk due to increased likelihood of trauma in routine pharyngeal procedures, which are often performed without preoperative imaging (adenotonsillectomy, intubation, and dental procedures) [3].

The American Academy of Otolaryngology-Head & Neck Surgery's Clinical Practice Guideline for tonsillectomy in children recommends tonsillectomy as first-line treatment for children with obstructive sleep apnea as diagnosed by polysomnogram [6]. However, patients who are considered high-risk surgical candidates are excluded from this recommendation [6]. Adenotonsillectomy has been shown in several studies to significantly improve behavioral, quality-of-life, and polysomnographic outcomes [7,8]. However, studies have indicated that 42–46% of children with obstructive sleep apnea who undergo watchful waiting rather than tonsillectomy will have spontaneous normalization of their polysomnogram by 7 months [7,8]. These results reinforce that observation is a valid management option for high-risk surgical candidates.

Our case illustrates the necessity of careful examination prior to tonsillectomy, the utility of observation in high-risk surgical candidates, and the importance of imaging in the setting of a suspected aberrant course of the ICA.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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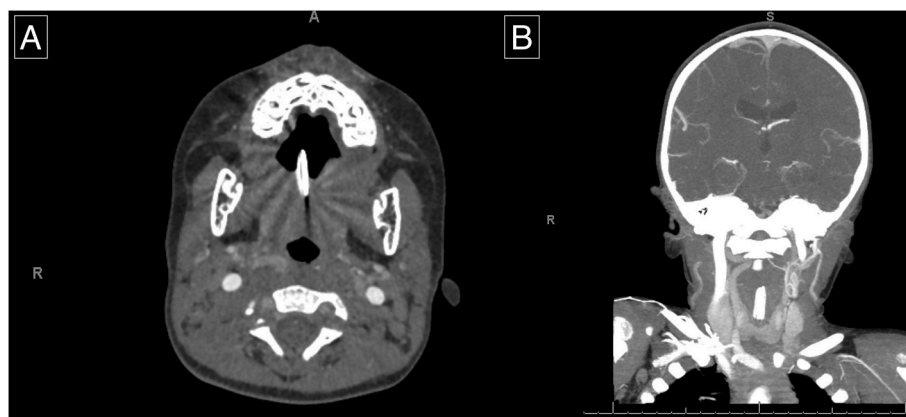


Fig. 2. Computed tomography angiogram demonstrating retropharyngeal medialized right internal carotid artery in axial (A) and coronal planes (B). R = right, A = anterior, S = superior.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.xocr.2021.100274>.

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